II.C.2 Startech Hydrogen Production (New Project)*

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** Congressionally directed project*

Objectives

The purpose of this project is to evaluate viability of integrated hydrogen production from waste materials using a plasma converter and a StarCell multistage ceramic membrane hydrogen separation system. Specifically, this project will achieve the following:

- Field test integrated hydrogen production on a pilot scale using plasma gasification and ceramic membrane hydrogen separation.
- Evaluate commercial viability and scalability through extended operation under representative conditions.

Technical Barriers

This project addresses the following technical barriers from the Hydrogen Production section of the Hydrogen, Fuel Cells and Infrastructure Technologies Program Multi-Year Research, Development and Demonstration Plan:

- G. Efficiency of Gasification, Pyrolysis, and Reforming Technology

Approach

This project aims to benchmark plasma conversion as an advanced fuel-flexible reformer technology; reduce fuel processing costs by implementing single-step gasification and reforming; broaden feedstock flexibility to utilize coal, and surrogate municipal and medical waste as representative gasification feedstocks; and determine gas polisher efficiency and suitability of synthesis gas for subsequent processes. Advantages of the plasma conversion system are competitive capital and operating and maintenance costs, fewer water and feedstock issues than in other processes, and reduced gasification control and safety issues due to the ambient pressure and continuous feed that are involved.

To achieve the targets listed above, Startech will implement the following approach.

- Utilize StarCell ceramic membrane system to purify hydrogen from a mixed synthesis gas.
- Utilize plasma converter gasification system to generate hydrogen-rich synthesis gas.
- Measure processing cost and quality of hydrogen production from several representative feedstocks.
- Characterize plasma gasification and membrane separation as an integrated hydrogen production system.
- Determine viability for StarCell scale-up and next phase development.